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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/584,108

04/11/2007

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EXAMINER

KOLB, NATHANIEL J

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/584,108	<b>Applicant(s)</b> SONG ET AL.	
	<b>Examiner</b> NATHANIEL KOLB	<b>Art Unit</b> 2856	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 April 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/22/2006 and 4/11/2007</u> .                                 | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Summary***

1. Claims 1-5 of US application 10/584,108 are pending. This is a first action on the merits.

### ***Drawings***

2. FIG.1 is objected to because it does not match with the rest of the disclosure. Block 400 of FIG. 1 should read  $K < KL$  in keeping with the specification.

### ***Claim Objections***

3. Claim 1 is objected to because of the following informalities: awkward wording. The last paragraph of claim 1 is unclear. It says that "when reaction gas is supplied... such that the... ratio is within the predetermined range...seasoning the interior... to change the ratio". It sounds like the applicant is writing that once reaction gas is supplied to the chamber to produce the correct ratio, gas will be supplied to the chamber to change the ratio. However, the specification states that whole purpose of the device is to bring this ratio to within a predetermined range. The examiner is interpreting this section of the claim to mean that the chamber is seasoned with reaction gas to bring the optical emission intensity ratio to within a predetermined range. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claim 3 recites the limitation "the upper limit value" in para. 2. There is insufficient antecedent basis for this limitation in the claim.
6. Claim 3 recites the limitation "the lower limit value" in para. 4. There is insufficient antecedent basis for this limitation in the claim.
7. Claim 5 recites the limitation "the ratio of optical emission intensity" in para. 5. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over KIM et al (US Pub. 2003/0052083).
10. **Regarding claim 1:** Claim 1 states "*A plasma equipment seasoning method comprising the steps of: measuring the ratio of optical emission intensity of silicon oxide (SiO<sub>x</sub>)- based chemical species to optical emission intensity of carbon fluoride compound (CF<sub>y</sub>)- based chemical species present in a process chamber of plasma equipment before operating the plasma equipment to perform a plasma process*". KIM teaches measuring the intensity of the optical emission of carbon containing species and silicon containing species in para. 11 lines 6-12, and teaches taking the ratio of these measurements in para. 9 lines 12-16. While KIM does not teach measuring the particular carbon species CF<sub>y</sub> and the particular silicon species SiO<sub>x</sub>, he teaches that

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CF<sub>4</sub> is present in the chamber in para. 29 lines 4-6 and that SiO<sub>2</sub> is present in para. 31 lines 13-15. Therefore the measurement of them is an obvious variation. Claim 1 continues *“determining whether the value of the measured optical emission intensity ratio is within a predetermined range of normal state or not”*. Determining if the ratio falls within a range of predetermined values is taught in para. 9 lines 16-17. Claim 1 continues *“and when reaction gas to be used in the plasma process is supplied into the process chamber based on the result of determination such that the value of the measured optical emission intensity ratio is within the predetermined range of normal state, seasoning the interior of the process chamber to change the ratio of components of the reaction gas, and thus, to change the optical emission intensity ratio.”* Para. 9 lines 16-19 of KIM teach operating a gas supply to treat the chamber until the ratio falls within a range of predetermined values.

11. **Regarding claim 2:** Claim 2 states *“The method as set forth in claim 1”*. The rejection of claim 1 has been discussed above. Claim 2 continues *“wherein the optical emission intensity ratio measuring step comprises: supplying the reaction gas to be used in the plasma process into the process chamber”*. Supplying gas to the chamber is taught in para. 33 lines 1-3. Claim 2 continues *“changing the reaction gas into a plasma state”*. Para. 34 lines 1-3 teach that the gas is energized and para. 21 lines 6-8 teach that the energized gas can be in a plasma state. Claim 2 concludes *“and performing spectroscopic analysis through optical emission measurement.”* Para. 37 teaches optical measurement and lists a spectrometer as one possible device.

12. **Regarding claim 3:** Claim 3 states “*The method as set forth in claim 1*”. The rejection of claim 1 has been discussed above. Claim 3 continues “*wherein the seasoning step comprises: if the value of the measured optical emission intensity ratio is above the upper limit value of the predetermined range of normal state, performing first seasoning to supply first reaction gas having relatively increased percentage of a component that increases the optical emission intensity of the carbon fluoride compound (CF<sub>y</sub>)-based chemical species, among components of the reaction gas, into the process chamber and if the value of the measured optical emission intensity ratio is below the lower limit value of the predetermined range of normal state, performing second seasoning to supply second reaction gas having relatively increased percentage of a component that increases the optical emission intensity of the silicon oxide (SiO<sub>x</sub>)-based chemical species, among components of the reaction gas, into the process chamber.*” Para. 45 lines 4-14 teaches providing gas to bring a value within predetermined range, and para. 44 lines 10-19 teach that the value can be a ratio of wavelength intensities of the gas emissions. Para. 31 lines 20-25 teach that CF<sub>4</sub> can be added, which increases the optical emission intensity of the carbon fluoride based species. Para. 31 lines 20-25 also teach that O<sub>2</sub> can be added which increases the optical emission intensity of silicon oxide based species.

13. **Regarding claim 4:** Claim 4 states “*The method as set forth in claim 3*”. The rejection of claim 3 has been discussed above. Claim 4 continues “*wherein the reaction gas to be used in the plasma process includes carbon tetrafluoride (CF<sub>4</sub>) and oxygen gas (O<sub>2</sub>), the component that increases the optical emission intensity of the carbon*

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*fluoride compound (CF<sub>y</sub>)-based chemical species at the first seasoning step is the carbon tetrafluoride (CF<sub>4</sub>), and the component that increases the optical emission intensity of the silicon oxide (SiO<sub>x</sub>)-based chemical species at the second seasoning step is the oxygen gas (O<sub>2</sub>).*" Para. 31 lines 20-25 teach that CF<sub>4</sub> can be added, which increases the optical emission intensity of the carbon fluoride based species. Para. 31 lines 20-25 also teach that O<sub>2</sub> can be added which increases the optical emission intensity of silicon oxide based species.

14. **Regarding claim 5:** Claim 5 states "*Plasma equipment comprising: a process chamber having an inner space defined therein for performing a plasma process*". The chamber is taught in para. 32 lines 11-13, and the inner space is shown in FIG. 2. Claim 5 continues "*a plasma generating coil disposed on the process chamber for generating plasma*". The coil is taught in para. 34 lines 5-7. Claim 5 continues "*an optical emission spectroscopic analysis unit mounted to the wall of the process chamber for spectroscopically analyzing chemical species present in the process chamber*". KIM teaches a spectrometer in para. 37 lines 5-7. Claim 5 continues "*an optical emission intensity ratio value calculation unit for calculating the ratio of optical emission intensity of silicon oxide (SiO<sub>x</sub>)-based chemical species to optical emission intensity of carbon fluoride compound (CF<sub>y</sub>)- based chemical species from the results collected and spectroscopically analyzed by the optical emission spectroscopic analysis unit*" KIM teaches a controller that receives and evaluates signals in para. 39 lines 1-3. This includes the ratio of the intensities of carbon-containing species to silicon-containing species as taught in para. 23 lines 10-15. Claim 5 continues "*and comparing the value*

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*of the calculated optical emission intensity ratio with a predetermined range of normal state to determine whether seasoning is necessary and what kind of seasoning is appropriate if the seasoning is necessary".* Comparing the ratio with a predetermined range is taught in para. 9 lines 16-17. Claim 5 continues *"and a main control unit for controlling supply of reaction gas introduced into the process chamber to perform the seasoning based on the determination of the optical emission intensity ratio value calculation unit."* This function is also performed by the controller as taught in para. 39. As previously stated, KIM teaches all of the process and function of the current application, but does not specify that the silicon-containing species that is measured is  $\text{SiO}_x$  and the carbon containing species that is measured is  $\text{CF}_y$ . Since KIM teaches that species of  $\text{SiO}_x$  and  $\text{CF}_y$  are present in the chamber (para. 29 lines 4-6 and para. 31 lines 13-14), measuring these particular species is an obvious variation.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHANIEL KOLB whose telephone number is 571-270-7601. The examiner can normally be reached on Mon-Thu 8am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NATHANIEL KOLB/  
Examiner, Art Unit 2856

/Tung S. Lau/  
Primary Examiner, Art Unit 2863  
April 9, 2009